MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

O. M. BEKETOV NATIONAL UNIVERSITY
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Methodological guidelines

for independent work

on the subject

"ENGLISH"

(for 1-year full-time Bachelor degree students majoring in 185 – Oil and Gas Industry and Technologies)

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UNIT 1. Higher education in Ukraine

Task1. Read and translate the text.

Higher education in Ukraine has a long and rich history. Its students, graduates and academics have long been known and appreciated worldwide. The pioneering research of scholars working in the country's higher education institutions and academies, such as Dmytro Mendeleyev, Mykola Zhukovsky, and Yeugeny Paton, are part of the universal history of scientific progress.

Brief historical survey

The first higher education institutions (HEIs) emerged in Ukraine during the late 16th and early 17th centuries. The first Ukrainian higher education institution was the Ostrozka School, or Ostrozkiy Greek-Slavic-Latin Collegium, similar to Western European higher education institutions of the time. Established in 1576 in the town of Ostrog, the Collegium was the first higher education institution in the Eastern Slavic territories. The oldest university was the Kyiv Mohyla Academy, first established in 1632 and in 1694 officially recognized by the government of Imperial Russia as a higher education institution. Among the oldest is also the Lviv University, founded in 1661. More higher education institutions were set up in the 19th century, beginning with universities in Kharkiv (1805), Kiev (1834), Odessa (1865), and Chernivtsi (1875) and a number of professional higher education institutions, e.g.: Nizhyn Historical and Philological Institute (originally established as the Gymnasium of Higher Sciences in 1805), a Veterinary Institute (1873) and a Technological Institute (1885) in Kharkiv, a Polytechnic Institute in Kiev (1898) and a Higher Mining School (1899) in Katerynoslav. Rapid growth followed in the Soviet period. By 1988 a number of higher education institutions increased to 146 with over 850,000 students. Most HEIs established after 1990 are those owned by private organizations.

The *Constitution of Ukraine (1996)*, *Law on Education (1996)*, and the *Law on Higher Education (2002)* constitute the legal framework for Ukrainian higher education. The Ukrainian legislation regulating higher education includes also more limited legislation as well as decrees and regulations of the President and the Cabinet of Ministers of Ukraine.

Higher education qualifications

Higher education qualifications combine both academic and professional qualifications. This is a very important feature of Ukrainian higher education inherited from its Soviet past. The State Diploma serves as both an educational certificate and a professional licence. Employment is determined by a match between the state determination of the knowledge and skills required for different occupation levels and the state determination of levels of educational qualification. Hence is the

correspondence between classification of educational qualification and that of the occupational structure, leading to the introduction of the term 'educational-proficiency' level.

The *Law on Higher Education* (2002) establishes the three-level structure of higher education: incomplete, basic, and complete educational levels with corresponding educational-proficiency levels of Junior Specialist, Bachelor, Specialist and Master.

Junior Specialist

Junior Specialist is an educational-proficiency level of higher education of a person who on the basis of complete secondary education has attained incomplete higher education, special skills and knowledge sufficient for discharging productive functions at a certain level of professional activity, stipulated for initial positions in a certain type of economic activity. The normative period of training makes 2.5–3 years.

Persons with basic secondary education may study in the educational and professional programs of junior specialist's training, obtaining at the same time complete secondary education.

Bachelor

Bachelor is an educational-proficiency level of higher education of a person who on the basis of complete secondary education has attained basic higher education, fundamental and special skills and knowledge, sufficient to cope with tasks and duties (work) at a certain level of professional activity (in economy, science, engineering, culture, arts, etc.). The normative period of training makes 4 years (240 ECTS credits).

Training specialists of the educational-proficiency level of Bachelor may be carried out according to the shortened program of studies on the basis of the educational-proficiency level of Junior Specialist.

Specialist

Specialist is an educational-proficiency level of higher education of a person who on the basis of the educational-proficiency level of Bachelor has attained complete higher education, special skills and knowledge, sufficient to cope with tasks and duties (work) at a certain level of professional activity (in economy, science, engineering, culture, arts, etc.). The normative period of training makes 1 year (60 ECTS credits).

Master

Master is an educational-proficiency level of higher education of a person who has attained complete higher education, special skills and knowledge, sufficient to cope with professional tasks and duties (work) of innovative character at a certain level of professional activity (in engineering, busyness administration, pedagogics, arts, etc.).

Training specialists of the educational-proficiency level of Master may also be carried out on the basis of the educational-proficiency level of Specialist. The period of training makes typically 1–1.5 year (60-90 ECTS credits).

During his/her studies at the Master's or Specialist's level, students are required to write his/her final work on a selected subject and make its presentation, to be able to collect, analyse and summarize, synthesize and to communicate study and practical material; often knowledge of a foreign language is required.

Training specialists of the educational-proficiency level of Specialist or Master in such fields as medicine, dentistry, veterinary medicine, teaching is carried out on the basis of complete secondary education within the period of 5–6 years (301-360 ECTS credits) (as is common in Western Europe for state registered professions).

Diplomas and Certificates

Higher education graduates are awarded qualifications of the appropriate educational-proficiency levels and they are granted diplomas of the state format. The Diploma is the State-recognized document which serves as both an educational certificate and a professional licence, confirming the attainment of the appropriate higher educational level and qualification of a certain educational-proficiency level (an academic degree in a field of study and speciality). The *Law on Higher Education* (2002) establishes the following types of documents that confirm higher education qualifications:

- *Dyplom Molodshoho Spetsialista* (Diploma/ qualification of Junior Specialist)
- *Dyplom Bakalavra* (Diploma/ qualification of Bachelor)
- *Dyplom Spetsialista* (Diploma/ qualification of Specialist)
- *Dyplom Mahistra* (Diploma/ qualification of Master)

Types of Universities (Academies)

The Ministry of Education and Science (Sports and Youth) recognizes the following categories of institutions of the top-level accreditation:

- Classical Universities
- Technical Universities
- Technological (Construction, Transportation)
- Pedagogical (Humanitarian, Physical Education and Sports)

- Culture (Arts, Design)
- Health Care Universities
- Agrarian Universities
- Economics (Finance, Administration, Entrepreneurship)
- Law (Law enforcement, Civil protection and life safety)
- Private Universities

Postgraduate education

In Ukraine Postgraduate education is regarded as specialist education and professional training commencing after the Specialist, Master phase. The *Law of Higher Education (Article 10)* and the *Law on Education (Article 47)* regard Post-Graduate education as specialised education and professional training on the basis of the previously obtained educational-proficiency level and experience of the practical work. It is defined as retraining, specialisation within a profession; expansion of the professional profile; probation within a profession, i.e. post-qualifying education or continuous professional development. The system of Postgraduate training serves as a ground for lifelong learning.

Task 2. Answer the questions

1. What can you tell about history of higher education development in Ukraine?
2. When did the first university emerge in Ukraine?
3. What are educational-proficiency levels of education?
4. What types of universities do you know?
5. How is Postgraduate education regarded?

Task 3. What do these numbers refer to?

17, 1576, 1632, 1805, 1834, 1865, 1875, 1996, 2002, 2.5-3, 4, 1.

Task 4. Match the left column with the right one according to the text.

The first higher education institutions (HEIs)	both academic and professional qualifications.
The oldest university was	also the Lviv University, founded in 1661.
Among the oldest is	at a certain level of professional activity

Higher education qualifications combine	emerged in Ukraine during the late 16th and early 17th centuries.
Higher education graduates	the Kyiv Mohyla Academy, first established in 1632.
to cope with tasks and duties (work)	are awarded qualifications of the appropriate educational-proficiency level.

Task 5. Among three options choose the most suitable synonym for the underlined word.

The first higher education institutions (HEIs) <u>emerged</u> in Ukraine during the late 16th and early 17th centuries.

a) Appeared b) developed c) run

More higher education institutions were <u>set up</u> in the 19th century, beginning with universities in Kharkiv (1805), Kiev (1834), Odessa (1865), and Chernivtsi (1875).

a) Inhabited b)established c)built

Persons with basic secondary education may study in the educational and professional programs of junior specialist's training, obtaining at the same time <u>complete</u> secondary education.

a) Sufficient b)full c)absolute

In Ukraine Postgraduate education is <u>regarded</u> as specialist education and professional training commencing after the Specialist, Master phase.

a) considered b) allowed c) put

Task 6. Put the verb in brackets into the correct form (Present Simple, Past Simple)

1. The first Ukrainian higher education institution ….. (be) the Ostrozka School, or Ostrozkiy Greek-Slavic-Latin Collegium, similar to Western European higher education institutions of the time.

2. By 1988 a number of higher education institutions ……(increase) to 146 with over 850,000 students.
3. The *Law on Higher Education* (2002) …… (establish) the three-level structure of higher education.
4. Higher education qualifications …….(combine) both academic and professional qualifications.
5. The normative period of training …….. (make) 4 years (240 ECTS credits).
6. The Ministry of Education and Science (Sports and Youth) …… (recognize) the following categories of institutions of the top-level accreditation.
7.

UNIT 2. Education in England

Task 1. Read and translate the text.

The chapel of King's College, Cambridge University.

0	**D**

Education in England is overseen by the Department for Education and the Department for Business, Innovation and Skills. Local authorities (LAs) take responsibility for implementing policy for public education and state schools at a local level.

The education system is divided into early years (ages 3–4), primary education (ages 4–11), secondary education (ages 11–18) and tertiary education (ages 18+).

Full-time education is compulsory for all children aged between 5 and 17 (from 2013, and up to 18 from 2015), either at school or otherwise, with a child beginning primary education during the school year he or she turns 5. Students may then continue their secondary studies for a further two years (sixth form), leading most typically to A-level qualifications, although other qualifications and courses exist, including Business and Technology Education Council (BTEC) qualifications, the International Baccalaureate (IB) and the Cambridge Pre-U. The leaving age for compulsory education was raised to 18 by the Education and Skills Act 2008. The change takes effect in 2013 for 16-year-olds and 2015 for 17-year-olds. State-provided schooling and sixth form education is paid for by taxes. England also has a tradition of independent schooling, but parents may choose to educate their children by any suitable means.

Higher education often begins with a three-year bachelor's degree. Postgraduate degrees include master's degrees, either taught or by research, and the doctorate, a research degree that usually takes at least three years. Universities require a Royal Charter in order to issue degrees, and all but one are financed by the state via tuition fees, which cost up to £9,000 per academic year for English, Welsh and EU students.

1

Until 1870 all schools were charitable or private institutions, but in that year the Elementary Education Act 1870 permitted local governments to complement the existing elementary schools, to fill up any gaps. The Education Act 1902 allowed local authorities to create secondary schools. The Education Act 1918 abolished fees for elementary schools.

2

The school year begins on 1 September (or 1 August if a term starts in August). Education is compulsory for all children from the next "prescribed day" which falls either on or after their fifth birthday to the last Friday in June of the school year in which they turn 16. This will be raised, in 2013, to the year in which they turn 17 and, in 2015, to their 18th birthday. The prescribed days are 31 August, 31 December and 31 March.

3

State-run schools and colleges are financed through national taxation, and take pupils free of charge between the ages of 3 and 18. The schools may levy charges for activities such as swimming, theatre visits and field trips, provided the charges are voluntary, thus ensuring that those who cannot afford to pay are allowed to

participate in such events. Approximately 93% of English schoolchildren attend such schools.

A significant minority of state-funded schools are faith schools, which are attached to religious groups, most often the Church of England or the Roman Catholic Church.

There is also a small number of state-funded boarding schools, which typically charge for board but not tuition. Boarding fees are limited to £12,000 per annum.

4

The University of Birmingham, a 'Red Brick university'.

Students normally enter university from age 18 onwards, and study for an academic degree. Historically, all undergraduate education outside the private University of Buckingham and BPP University College was largely state-financed, with a small contribution from top-up fees, however fees of up to £9,000 per annum have been charged from October 2012. There is a distinct hierarchy among universities, with the Russell Group containing most of the country's more prestigious, research-led and research-focused universities. The state does not control university syllabuses, but it does influence admission procedures through the Office for Fair Access (OfFA), which approves and monitors access agreements to safeguard and promote fair access to higher education. Unlike most degrees, the state still has control over teacher training courses, and uses its Ofsted inspectors to maintain standards.

The typical first degree offered at English universities is the bachelor's degree, and usually lasts for three years. Many institutions now offer an undergraduate master's degree as a first degree, which typically lasts for four years. During a first degree students are known as undergraduates. The difference in fees between undergraduate and traditional postgraduate master's degrees (and the possibility of securing LEA

funding for the former) makes taking an undergraduate master's degree as a first degree a more attractive option, although the novelty of undergraduate master's degrees means that the relative educational merit of the two is currently unclear.

Some universities offer a vocationally based foundation degree, typically two years in length for those students who hope to continue on to a first degree but wish to remain in employment.

5

Students who have completed a first degree are eligible to undertake a postgraduate degree, which might be a:

- Master's degree (typically taken in one year, though research-based master's degrees may last for two)
- Doctorate (typically taken in three years)

Postgraduate education is not automatically financed by the state, and so admissions are highly competitive.

Task 2. Questions

1) What is education in England overseen by?
2) How is the education system divided into?
3) Is education compulsory for children aged between 5 and 17?

Task 3. Choose the most suitable heading from the list A-G for each part (1–6) of the text. There is one extra heading which you do not need to use. There is an example at the beginning (0).

A Postgraduate education

B Primary and secondary education

C History of English education

D Introduction

E Principles of education in England

F State-funded school system

G Higher education

UNIT 3. Education in the USA

Task 1. Read and translate the text.

The USA does not have a national system of education. All educational matters are left to states. 50 per cent of funds for education come from state sources, about 40 from local funds, and only 6 per cent from the federal government. There are two major types of schools in the USA— public which are free, and private, or fee-paying. Four of five private schools are run by churches and other religious groups.

Elementary education starts at the age of 6 and continues till 10-11 years. Secondary education is provided from the age 11 — 12. Intermediate school includes grades 6 through 9 for ages 11-12 up to 14—15. A senior high school may include grades 9—10 through 12. A senior high school may be comprehensive, general or vocational. A comprehensive school offers a broad program of academic and vocational education, a general school offers a more limited program. A vocational school focuses on vocational training with some general educational subjects. All such programs — academic, technical, or practical are generally taught under one roof. Nevertheless, many students of high school don't finish it. 1 per cent of American citizens at the age of 14 can neither read, nor write. High school students who wish to attend a college or a university go through one of the two standard tests — SAT (Scholastic Aptitude Test) and ACT (American College Test). They are given by non-profit, non-governmental organizations.

There are several ways to continue in education: universities, colleges, community colleges, and technical and vocational schools. A university in the USA usually consists of several colleges; each college specializes in a subject area. There are colleges of liberal arts, colleges of education and business colleges. A program for undergraduates usually takes four years and leads to the Bachelor of Arts or Science degree. After that, students may leave the university or go on for a graduate or professional degree. The university may be funded from several different sources. A publicly funded university gets some money form the state government. A privately funded university gets money from private sources only. A university may be funded by a religious group.

College students usually spend four years at the college, too, and get the Bachelor's degree. In contrast to universities, colleges don't have graduate or professional programs. Colleges in the USA differ greatly in size — they may include from 100 students to 5000 and more. Most of the larger institutions fall into the category of universities, the largest being the University of California, State university of New York, New York university, Columbia University and others.

The course of study in a community college lasts two years and doesn't lead to any degree. Community colleges may give courses in the regular academic subjects or subject like dental technology, sewing and other non-academic subjects. Not all students of community colleges have high school diplomas. Technical, or vocational schools have no academic programs and provide only job training. Programs may take from six months to two years and more.

Task 2. Answer the questions

1) What are characteristics of education in the USA?
2) What are two major types of schools in the USA?
3) Ta what age does elementary (secondary, intermediate, senior high school) education starts?
4) What does a comprehensive school offer?
5) What does a vocational school focus on?
6) What are the ways to continue in education?

Task 3. Translate the following sentences into English.

1. В США, где все вопросы образования находятся в ведении штатов, образование финансируется штатами, из местных фондов и религиозными группами, и только около 6 процентов финансирования исходит от федерального правительства.

2. В США общественные школы бесплатные, а частные школы платные.

3. Школьное образование состоит из начального образования, промежуточного образования и старших классов средней школы.

4. В старших классах средней общеобразовательной школы предлагается обширная программа академических и профессиональных предметов, преподаваемых в одном здании.

5. Программа общей школы более ограничена, чем программа общеобразовательной школы.

6. Программа профессиональной школы предлагает профессиональную подготовку и некоторые академические предметы.

7. Выпускники средней школы должны сдать один из двух стандартных тестов, SAT или ACT, которые проводятся некоммерческими, неправительственными организациями.

8. Выпускники средней школы, которые хотят продолжить образование в вузе, могут попытаться поступить в университет, колледж или техническую или профессиональную школу.

9. Программа для студентов колледжа или университета заканчивается присвоением звания бакалавра гуманитарных или точных и естественных наук.

10. Выпускники колледжа должны идти в университет, чтобы получить ученую степень выше бакалавра или профессиональную степень.

Task 1. Read and translate the text.

Higher Education in the USA

Many students, upon finishing high school, choose to continue their education. The system of higher education includes 4 categories of institutions.

The community college, which is financed by the local community in different professions. Tuition fees are low in these colleges, that's why about 40 per cent of all American students of higher education study at these colleges. On graduation from such colleges American students get "associate degree" and can start to work or may transfer to 4-year colleges or universities (usually to the 3rd year).

The technical training institution, at which high school graduates may take courses ranging from six months to three-four years, and learn different technical skills, which may include design business, computer programming, accounting, etc. The best-known of them are: the Massachusetts Institute of Technology and the Technological Institute in California.

The four-year college, which is not a part of a university. The graduates receive the degree of Bachelor of Arts (BA) or Bachelor of Science (BS). There are also small Art Colleges, which grant degrees in specialized fields such as ballet, film-making and even circus performance. There are also Pedagogical Colleges.

The university, which may contain:

several colleges for students who want to receive a bachelor's degree after four years of study;

one or more graduate schools for those who want to continue their studies after college for about two years to receive a master's degree and then a doctor's degree. There are 156 universities in the USA.

Any of these institutions of higher education may be either public or private. The public institutions are financed by state. Most of the students, about 80 per cent, study at public institutions of higher education, because tuition fees here are much lower. Some of the best-known private universities are Harvard. Yale and Princeton.

It is not easy to enter a college at a leading university in the United States. Successful applicants at colleges of higher education are usually chosen on the basis of:

their high-school records which include their class rank, the list of all the courses taken and all the grades received in high school, test results;

recommendation from their high-school teachers;

the impression they make during interviews at the university, which is in fact a serious examination;

scores on the Scholastic Aptitude Tests.

The academic year is usually nine months, divided into two terms. Studies usually begin in September and end in July. Each college or university has its own curriculum. During one term a student must study 4 or 5 different courses. There are courses that every student has to take in order to receive a degree. These courses or subjects are called major subjects or "majors".

At the same time there are subjects which the student may choose himself for his future life. These courses are called 'electives". A student has to earn a certain number of "credits" (about 120) in order to receive a degree at the end of four years of college. Credits are earned by attending lectures or laboratory classes and completing assignments and examinations.

Students who study at a university or four-year college are known as undergraduates. Those who have received a degree after 4 years of studies are known as graduates. They may take graduate program for another 2 years in order to get a master's degree. Further studies are postgraduate which result in a doctor's degree.

Task 2. Answer the questions

1) What categories does the system of higher education include?
2) What is the community college financed by?
3) What does studing in the technical training institution include?
4) What may the university contain?
5) Are institutions of higher education public or private?
6) What courses are called 'electives"?

Task 3 . Match the left column with the right one

The system of higher education	small Art Colleges.
The institutions of higher education	includes 4 categories of institutions.

Tuition fees are low	may be either public or private.
Students who study at a university or	after 4 years of studies are known as graduates.
Those who have received a degree in	community colleges
There are also	four-year college are known as undergraduates.

Task 4. Put the verbs into Active or Passive voice

1) Many students, upon finishing high school, ……..(choose) to continue their education.
2) The community college ……(finance) by the local community in different professions.
3) In the technical training institution high school graduates……(may, take) courses ranging from six months to three-four years.
4) The academic year ……(be) usually nine months, divided into two terms.
5) These courses or subjects …….(call) major subjects or "majors".
6) . Credits ……..(earn) by attending lectures or laboratory classes and completing assignments and examinations.
7) Students who study at a university or four-year college …….. (know) as undergraduates.
8) They ……..(may, take) graduate program for another 2 years in order to get a master's degree.

UNIT 4. The benefits of the fourth industrial revolution for oil and gas

Task 1. Read and translate the text.

The oil and gas industry has experienced turbulent times in the last two years, and companies in the sector have made massive efforts to curb costs and scale back on new project development.

Based on the uncertainties about the direction of industry, there has been much speculation about the continuity of petroleum as the main source of energy in modern civilisation, and about the permanence of low oil prices for an extended period.

Analyses of the usual practices in the oil and gas industry suggest that the sector is undergoing digital disruption and a technological re-organisation of its methods and industrial processes, in-line with a global technological trend that German business has coined as “Industry 4.0” or the "fourth industrial revolution".

In this context, the first two industrial revolutions are the advent of steam and electrification, the third is the digital era and the fourth is the current age of robotics, automation and the internet of things.

Task 2. Answer the questions

1. What has the oil and gas industry experienced in the last two years?
2. What is the main source of energy in modern civilization?
3. What can be said about three industrial revolutions?
4. What is the "fourth industrial revolution"?

Task 3. Put the verbs into the suitable form

1. The oil and gas industry …….(experience) turbulent times in the last two years.
2. Companies in the sector ……(make) massive efforts to curb costs and scale back on new project development.
3. There ……..(be) much speculation about the continuity of petroleum as the main source of energy in modern civilization.
4. Analyses of the usual practices in the oil and gas industry ……(suggest) that the sector ……..(undergo) digital disruption.
5. Tthe first two industrial revolutions ……..(be) the advent of steam and electrification.
6. The third industrial evolution.……(be) the digital era and the fourth is the current age of robotics, automation and the internet of things.

UNIT 5. Global demographic change.

Will peak oil ever come?

Several prospective models indicate that petroleum, as an energy source, will become obsolete at some point in the future.

The big question that challenges researchers around the world is when this will be supplanted and replaced in a consistent and definitive way.

Considering that the development of any basic infrastructure for a new energy source may require decades, it can be expected that the transition should happen gradually and in a structured manner.

The most likely change to occur is the incorporation of new technologies to make petroleum energy cleaner and more efficient, in order to allow a gradual flux of the energy matrix through the introduction of renewable resources.

Considering the increase in the quality of life in the developing world, it is expected that the demand for energy will continue to grow, regardless of which energy sources will be used to meet this demand.

Based on the current reality, it is believed that the oil and gas industry will retain its leading position in the global energy matrix for a long period.

In the near future, demand will again overcome the supply, generating pressure on prices and making field developments that are not commercially-attractive that are not viable today.

Task 2. Match the left column with the right one

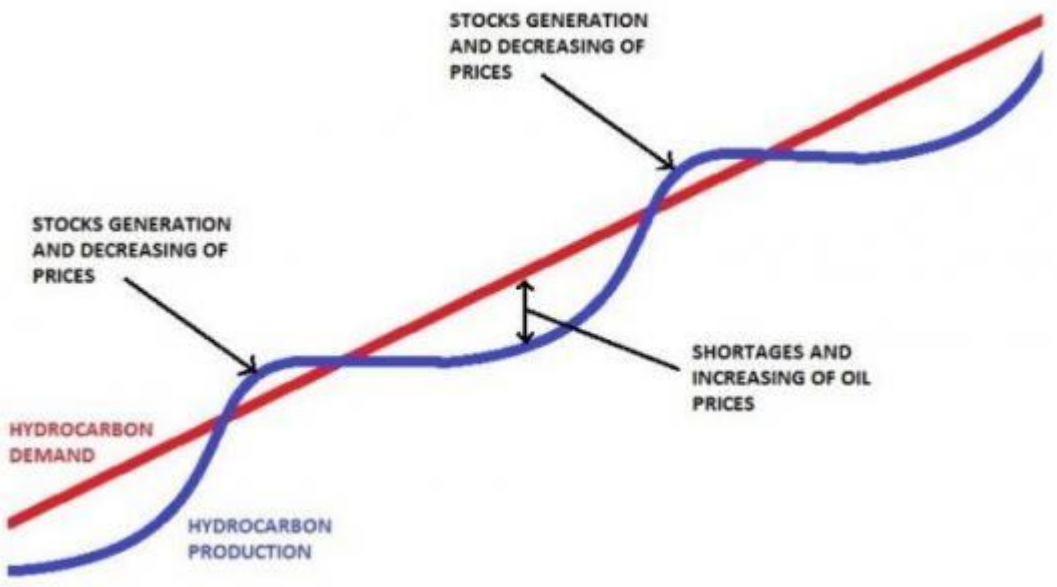
at some point	happen gradually
to challenge researchers	will continue to grow
the transition should	cleaner and more efficient
The most likely	change to occur
to make petroleum energy	around the world
a gradual flux of	the energy matrix
the increase	in the quality of life
demand for energy	in the future

Task 3. Read and translate the text

Recurring patterns, the environmental angle and the undersea challenge.

Due to the engineering effort and the time required to develop new fields, inertia reigns with regards to achieving an overall production increase.

However, since projects come into commission in waves, the supply again exceeds the demand, leading to inventories increase and fall in oil prices again, which is reflected in a there will always be cyclical behaviour with regards to supply and demand, as illustrated below (Figure 1).



(Figure 1 – The oil and gas supply and demand cycle)

One can not disregard the facts that underlie climate change and the potential environmental risks that go hand-in-hand with the oil and gas industry.

Given the difficulties of incorporating new technologies abruptly in the energy matrix, it is imperative that methods and processes of exploration and production should evolve in order to make industry more efficient and to minimise its potential environmental impacts.

Industry 4.0's revolution will have to be a leaner and greener one.

The development of new technologies, methods and processes has been encouraged and led by major companies in the industry across the service provider and operator divide.

A few of these to make a tangible difference are subsea processing systems, intelligent wells technologies, real-time monitoring, data analysis and production management technologies.

Subsea processing is a solution adopted by oil companies to access reserves located in remote areas or where environmental conditions are hostile to the traditional way of conducting business, such as the North Sea, the Arctic, the North Slope of Alaska and in the deep waters of Brazil and the Gulf of Mexico.

The advantages of placing processing equipment on the seabed are to maximise and accelerate the recovery of oil, increasing its yield, extending the life of field and reducing the number of floating production units and surface processing plants.

According to information collected by industry experts, wells engineering is responsible for about 40 per cent of the development costs of a typical offshore project in ultra-deep water.

In order to reduce the overall investment in this area, several initiatives have been undertaken in the search for a more cost-effective way to construct subsea wells.

Innovative technologies such as smart completion systems allow multiple production zones to be tapped by the same well, which reduces the need for investment in the exploration and production of an area consisting of several reservoirs or production sites.

Task 4. Answer the questions

1. What can happen when the supply exceeds the demand?
2. Why do climate change and the potential environmental risks go hand-in-hand with the oil and gas industry?
3. What is subsea processing?
4. What is wells engineering responsible for?

Task 5. Match the left column with the right one

Change	the action or process of investing money for profit
difficulties	develop gradually
Exploration	the action of exploring an unfamiliar area
Evolve	make or become different
a solution	a means of solving a problem or dealing with a difficult situation
Responsible for	things that are hard to accomplish, deal with, or understand
Well	a shaft sunk into the ground to obtain water, oil, or gas
Investment	having an obligation to do something, or having control over or care for someone, as part of one's job or role

UNIT 6. The big data step change

Task 1. Read and translate the text.

From the information technology perspective, the development of large datasets has allowed industries to transform the way the automation has been applied, enabling real-time monitoring and control of operations.

In the oil and gas industry, several initiatives have been observed in the development of technologies for real-time monitoring and control of equipment and systems.

According to Howell , the "oil and gas digital field" is a growing trend within the industry, and will make possible the maximisation of economic returns on investment in a constantly fluctuation market.

A disruptive influence?

Some believe that by 2025, the oil and gas industry will be experiencing rates of digital disruption that will drastically reshape the common operating procedures we know today.

Industry 4.0 will bring fully-automated drilling operations, autonomous inspection of pipelines and the rig-less plugging and abandonment of wells. We can imagine that digital disruption for oil and gas will happen both broadly and swiftly.

Others see the fourth industrial revolution as a deeper change, which will fundamentally alter the way we live, work, and relate to one another.

While the extent of change the fourth industrial revolution will bring is an unknown quantity, we do know that we are facing an eminent point of transformation.

Capitalising on this and embracing it in a timely fashion would be akin to the technological difference between a ship running on steam and one running on diesel.

Task 2. Answer the questions

1. What has the development of large datasets allowed?
2. What is the "oil and gas digital field" according to Howell?
3. ,What will the oil and gas industry be experiencing by 2025?
4. What changes will the fourth industrial revolution cause?

Task 3. Put the verbs into the suitable form

1. From the information technology perspective, the development of large datasets ……(allow) industries to transform the way the automation …….(apply), enabling real-time monitoring and control of operations.
2. In the oil and gas industry, several initiatives …….(observe) in the development of technologies for real-time monitoring and control of equipment and systems.
3. Some …….(believe) that by 2025, the oil and gas industry …….(experience) rates of digital disruption that ……. drastically(reshape) the common operating procedures we ……(know) today.
4. Others see the fourth industrial revolution as a deeper change, which …….. fundamentally(alter) the way we ……(live, work, and relate) to one another .
5. While the extent of change the fourth industrial revolution ……(bring) is an unknown quantity, we do know that we ……..(face) an eminent point of transformation.

UNIT 7. Oil and Gas Industry Impact on Ecology of the Earth

Task 1. Read and translate the text.

The oil and gas industry is one of the most vital to our civilization. Even though several experiments are going on in terms of finding alternative sources of energy, it is petroleum that makes our lifestyle possible. Only for 2016, the IEA Oil Market Report forecasted an average demand of circa 96 million barrels of oil and liquid fuels per day, meaning more than 35 billion barrels per year.

Unfortunately, it comes with a price. The oil and gas industry has a significant impact on our environment. Thankfully, some effort has been made in order to minimize its negative effects over the recent years.

Carbon dioxide emission is one of the major environmental concerns

According to studies, the petroleum industry has a negative impact on many aspects of our environment due to its level of toxicity. The globe's climate change that is currently experienced has also been considered as a result of the constant extraction of oil, due to the greenhouse effect created by the large amounts of carbon dioxide in the atmosphere.

According to EIA (U.S. Energy Information Administration), around 19.64 pounds of carbon dioxide (CO2) are originated from burning a non-ethanol gallon of gasoline; and around 22.38 pounds of CO2 are produced from a gallon of diesel fuel.

The crude oil itself is the cause of death and birth defects on fish and birds every year. When the Deepwater Horizon 2010 spilt 205.8 million gallons of oil and 225,000 tons of methane into the Gulf of Mexico in 2010, only 25% of the product was recovered. And, according to the Center for Biodiversity report, it might have resulted in the harm of 82k birds, 6k sea turtles, and almost 26k marine mammals. Crude oil can also decrease the count of white cell in humans, destroying the immunologic system and leading to many forms of cancer, especially to leukemia.

The combustion of distillate oil is also an incomplete process that sends to the atmosphere several components toxic to life. These elements are also blamed for causing heart and lung diseases. Acid rain is another consequence of the combustion of petroleum, which is considered as the cause of death coral reefs, corrosion of machinery and structures, and the destruction of archaeological ruins.

Automobile exhaust and oil spills come next

Benzene, present in the automobile exhaust, is known for being extremely toxic, carcinogenic, and to damage DNA. Waste oil, such as used oil, is a source of many concerns originated from natural petroleum, as its toxins might eventually reach the environment, poisoning drinking water, soil, rivers, and oceans.

Regarding natural gas, there are several issues been taken into consideration. For starters, it is a non-renewable fuel that emits carbon dioxide when burned, and that contains 80 to 95% of methane, a gas related to the greenhouse effect. Natural gas is also explosive, potentially dangerous, and requires extensive pipelines to be transported over land.

Finally, oil spills are a constant cause of international discussions. Oil tankers, tank vessels, and facilities are the main sources of this form of pollution, usually happening as a result of routine operations, but are those caused by accidents that have the largest amounts of the oil spill and environmental damage consequently.

In the last year, approximately 7,000 tons of oil were spilt in the environment, most of it due to major spills: one in Singapore, when 4,500 tons of crude oil were lost; and the second in Turkey, when 1,400 tons of naphtha were released to the environment. A collision was the cause of both incidents.

What has been done to minimize the negative impact?

The oil and gas industry has been investing in technology and safety management so to minimize the negative impact of their products on the environment. And they are doing it not only for understanding their role but also for a question of business survival.

For instance, according to a study by PwC, 70% of oil and gas CEOs consider climate change and environmental damage as key risk to their industry. And 39% of them

affirmed that there would be soon a significant shift in the way they manage this issue in order to respond to stakeholders expectations.

The number of incidents regarding oil spills has also dramatically fallen since the 70 s when major incidents took place. In that decade, the average number of spills per year was 24.5 and nowadays it is of 1.8 per year. And several regulations and standards have been imposed by governments in many countries to ensure that the emission of greenhouse and other harmful gases will decrease in the next decades. So it is just a matter of time to the oil and gas industry makes relevant changes, and that we notice them on top companies' reviews, to maintain the sustainability of their business.

Task 3. Put the verbs into the correct form.

1. The oil and gas industry ….(be) one of the most vital to our civilization.

2. Even though several experiments ……..(go) on in terms of finding alternative sources of energy, it is petroleum that ……(make) our lifestyle possible.

3. Only for 2016, the IEA Oil Market Report ……..(forecast) an average demand of circa 96 million barrels of oil and liquid fuels per day, meaning more than 35 billion barrels per year.

4. According to studies, the petroleum industry…….(have) a negative impact on many aspects of our environment due to its level of toxicity.

5. The combustion of distillate oil……..(be) also an incomplete process that……..(send) to the atmosphere several components toxic to life.

6. Natural gas ……..(be) also explosive, potentially dangerous, and ……(require) extensive pipelines to be transported over land.

7. A collision ……..(be) the cause of both incidents.

8. The oil and gas industry ……(invest) in technology and safety management so to minimize the negative impact of their products on the environment.

9. And 39% of them affirmed that there …….(be) soon a significant shift in the way they…… (manage) this issue in order to respond to stakeholders expectations.

10. The number of incidents regarding oil spills …… also dramatically …….(fall) since the 70s when major incidents …….(take) place.

Task 4. Put the verbs into the correct form (Passive voice)

1. Some effort ……..(make) in order to minimize its negative effects over the recent years.

2. The globe's climate change that ……. currently ……(experience) ……. also ……(consider) as a result of the constant extraction of oil, due to the greenhouse effect created by the large amounts of carbon dioxide in the atmosphere.

3. Around 19.64 pounds of carbon dioxide (CO2) …….(originate) from burning a non-ethanol gallon of gasoline; and around 22.38 pounds of CO2 …….(produce) from a gallon of diesel fuel.

4. These elements ……... also ……..(blame) for causing heart and lung diseases.

5. Benzene, present in the automobile exhaust, …….(know) for being extremely toxic, carcinogenic, and to damage DNA.

6. Regarding natural gas, there are several issues ……..(take) into consideration.

7. In the last year, approximately 7,000 tons of oil …….(spilt) in the environment.

8. And several regulations and standards…….(impose) by governments in many countries to ensure that the emission of greenhouse and other harmful gases will decrease in the next decades.

UNIT 8. 5 Biggest Risks Faced By Oil And Gas Companies

Task 1. Read and translate the text.

Political Risk

The primary way that politics can affect oil is in the regulatory sense, but it's not necessarily the only way. Typically, an oil and gas company is covered by a range of regulations that limit where, when and how extraction is done. This interpretation of laws and regulations can also differ from state to state. That said, political risk generally increases when oil and gas companies are working on deposits abroad.

Oil and gas companies tend to prefer countries with stable political systems and a history of granting and enforcing long-term leases. However, some companies simply go where the oil and gas is, even if a particular country doesn't quite match their preferences. Numerous issues may arise from this, including sudden nationalization and/or shifting political winds that change the regulatory environment. Depending on what country the oil is being extracted from, the deal a company starts with is not always the deal it ends up with, as the government may change its mind after the capital is invested, in order to take more profit for itself.

Political risk can be obvious, such as developing in countries with an unstable dictatorship and a history of sudden nationalization - or more subtle - as found in nations that adjust foreign ownership rules to guarantee that domestic corporations gain an interest. An important approach that a company takes in mitigating this risk is careful analysis and building sustainable relationships with its international oil and gas partners, if it hopes to remain in there for the long run.

Geological Risk

Many of the easy-to-get oil and gas is already tapped out, or in the process of being tapped out. Exploration has moved on to areas that involve drilling in less friendly environments - like on a platform in the middle of an undulating ocean. There is a wide variety of unconventional oil and gas extraction techniques that have helped squeeze out resources in areas where it would have otherwise been impossible.

Geological risk refers to both the difficulty of extraction and the possibility that the accessible reserves in any deposit will be smaller than estimated. Oil and gas geologists work hard to minimize geological risk by testing frequently, so it is rare that estimates are way off. In fact, they use the terms "proven," "probable" and "possible" before reserve estimates, to express their level of confidence in the findings.

Price Risk

Beyond the geological risk, the price of oil and gas is the primary factor in deciding whether a reserve is economically feasible. Basically, the higher the geological barriers to easy extraction, the more price risk a given project faces. This is because unconventional extraction usually costs more than a vertical drill down to a deposit. This doesn't mean that oil and gas companies automatically mothball a project that becomes unprofitable due to a price dip. Often, these projects can't be quickly shut down and then restarted. Instead, O&G companies attempt to forecast the likely prices over the term of the project in order to decide whether to begin. Once a project has begun, price risk is a constant companion.

Supply and Demand Risks

Supply and demand shocks are a very real risk for oil and gas companies. As mentioned, operations take a lot of capital and time to get going, and they are not easy to mothball when prices go south, or ramp up when they go north. The uneven nature of production is part of what makes the price of oil and gas so volatile. Other economic factors also play into this, as financial crises and macroeconomic factors can dry up capital or otherwise affect the industry independently of the usual price risks.

Cost Risks

All of these preceding risks feed into the biggest of them all - operational costs. The more onerous the regulation and the more difficult the drill, the more expensive a project becomes. Couple this with uncertain prices due to worldwide production beyond any one company's control, and you have some real cost concerns. This is not

the end, however, as many oil and gas companies struggle to find and retain the qualified workers that they need during boom times, so payroll can quickly rise to add another cost to the overall picture. These costs, in turn, have made oil and gas a very capital-intensive industry, with fewer and fewer players all the time.

The Bottom Line

Oil and gas investing isn't going anywhere. Despite the risks, there is still a very real demand for energy, and oil and gas fills part of that demand. Investors can still find rewards in oil and gas, but it helps to know the potential risks that go along with those potential rewards.

UNIT 9. Key Ratios For Analyzing Oil And Gas Stocks

Task 1. Read and translate the text.

Oil and gas exploration and production (E&P) companies are unique from a valuation standpoint. Because of this, investors need to focus on a different subset of ratios to analyze the growth and profitability of these companies. Company revenues are important, but focus should be on netback. Oil and gas stocks are broken down into three parts:

1. Upstream

2. Midstream

3. Downstream An oil and gas company can contain anywhere from one to all three parts. Upstream refers to E&P. The second is midstream. It includes storing, transporting and marketing of oil, natural gas liquids and natural gas. The last is downstream, which is the refining of crude and the distribution of its byproducts. These three are very different from a business and investment prospective. This article focuses on upstream and the key ratios used to analyze it.

Oil and gas E&P stocks have greater volatility when compared to other businesses. Oil and natural gas prices see large price swings in the face of good or bad economic news. Hedging helps to reduce a company's exposure to this risk. Finding and developing costs can also vary greatly depending on the play, and how aggressively others are working the area. Production costs are variable, as geology can differ significantly depending on the area. What separates oil and gas producers from other types of investments is depletion. Technology has increased oil production, but newer methods deplete resources at a much faster rate. Vertical wells produced oil in a more consistent fashion, where production initially increased. After a period of time that production would begin to deplete slowly. Conventional resources are now less common as most of the "easy oil" has been produced. Because of this, unconventional resources have become the main source of crude and natural gas in the United States. Horizontal drilling has high initial production rates. Depletion rates

are also high, and begin immediately after production starts. Oil sands are also providing a new resource base, with extensive reserves in Canada. Both oil sands and shale provide little to no exploration risk and both types of resources are well defined.

To assess the value of an oil and gas E&P company, there are several variables of focus. Federal and state regulations can cause extrinsic problems for oil and gas. Changes in reserve pit rules are already creating additional costs. Reserve pits are where flowback is stored before the initial production phase. Fears of soil and aquifer pollution have pushed new rules. Frac water reuse is starting to be seen in some of the bigger plays. The blending of this with fresh water may become mandatory, as there are already issues with municipals being able to keep up with current water needs. Additional regulations could affect fracking, as has occurred in the Marcellus. Political risks can also affect the value of oil and gas stocks. Companies such as **Marathon** (NYSE:MRO) were negatively impacted by the civil war in Syria. Companies operating in the United States benefit from its stable government and politics.

UNIT 10. Dependence of Natural Gas Prices on Oil Trends

Task 1. Read and translate the text.

The oil markets have experienced significant price drops in the last year, mainly due to a massive supply glut. Natural gas prices, which have traditionally been coupled with oil, have followed the trend downward. Can investors count on natural gas prices to always follow crude oil? While natural gas and oil have historically moved together, the two commodities can and do diverge at times. In this article, we will examine the different factors affecting oil and natural gas prices.

Measurement in Production

The first basic difference we will look at is the units of measurement of production: oil is measured in barrels and natural gas is measured in units of 1000 cubic feet called Mcf (the M comes from the ancient Romans letter of M, which meant 1000). The most common way to convert these two is the barrels of oil equivalent (BOE). Here, 1 BOE is equal to 6,040 cubic feet of gas, or essentially 1 BOE is equal to 6 Mcf.

Price Correlation

Our discussion now moves us towards the price correlation between oil and natural gas by following crude oil and natural gas prices. If crude oil prices move up, will natural gas prices follow? Below is a chart showing oil and natural gas price correlations between 2003 and 2014. The average correlation was 26.53%. (For more see Do Oil and Natural Gas Rise and Fall Together?)

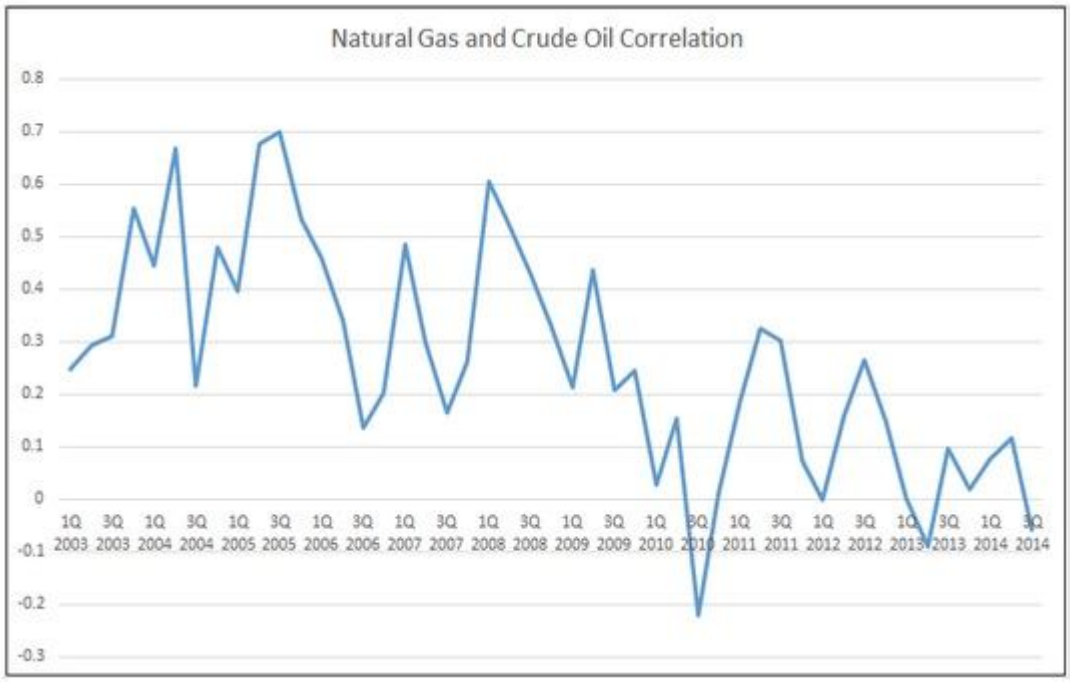


*Chart courtesy of stockcharts.com

As you can see in the chart above, crude oil and natural gas prices sometimes moved together and sometimes moved in opposite directions. In addition, notice how there were also wide variations in how closely they correlated with each other. One explanation for the difference is that oil is a global commodity while natural gas is a more regional commodity. As such, natural gas is affected by local conditions and seasonality.

Global Impact vs. Regional Impact

Another key difference to know when investing in oil versus natural gas is the main factors that influence their prices. The price of oil is influenced by many geopolitical and economic factors. The U.S. Energy Information Agency published a report listing seven factors that affect oil markets, including changes in production in Saudi Arabia, sudden supply disruptions, changes in non-OPEC supply and changes in production levels.

In comparison, the price of natural gas is much more influenced by regional factors. This is because it is more difficult to transport natural gas abroad than it is to transport oil. In addition, the price of natural gas fluctuates strongly with temperature. High and low temperatures are the most significant determinants of natural gas demand as consumers use the gas to heat and cool their homes. Natural gas accounts for 25% of total energy use in the United States. Around 61% of homes in the United States use natural gas for heating and cooling according to the EIA. Moreover, it is among the cleanest-burning fossil fuel available. (For more see A Natural Gas Primer.)

Main Users

Another important distinction between oil and gas are their main users. Crude oil is refined into different kinds of fuel like propane, kerosene, diesel oil and gasoline, all destined for different users. Kerosene fuels jets and diesel oil is used in long-distance trucking and other kinds of transportation. Approximately two-thirds of transportation in the United States is fueled by oil. For agriculture, oil is used both directly for operating machines and indirectly for the manufacture of pesticides and fertilizers. Like kerosene and diesel, gasoline is derived from oil. According to the U.S. Energy Information Agency, 46% percent of crude oil is refined into gasoline.

Natural gas has three main users-domestic (household), industrial and power generation plants. For domestic users, natural gas is used for heating and cooling homes. Domestic users are the main consumers of natural gas in the United States. Industrial users are the second largest consumers of natural gas. Like domestic users, they also use natural gas for heating and cooling their factories. Finally, power generation plants have increasingly sought out natural gas as a source of energy. Historically, power generation plants extract heat to convert into electricity from sources including coal, natural gas and oil. Coal has typically been the predominant source for power generation plants. According to the Financial Times, a new regulation from the U.S. Environmental Protection Agency has led to an increase in the demand for natural gas. Consequently, the use of coal has declined. In April 2015, gas generated more electricity than coal in the United States for the first time in its history.

The Bottom Line

As we can see through the comparison between oil and gas, there are many complex factors that influence the supply and demand for each of these commodities. While the price of natural gas is correlated to the price of oil, certain diverging factors, including the influence of geopolitics, the economy and seasonality, also come into effect.

UNIT 11.Top 10 challenges in Oil and Gas industry.

Task 1. Read and translate the text.

The Oil and Gas industry is going through massive disruption and, as we continue to be extremely dependent of these organic sources of energy, we have to look at the emerging new macro and micro trends affecting this global industry.

The Oil and Gas industry investments in the energy renaissance will continue to shift. As a result, new innovative trends will flow from the upstream sector to midstream infrastructure, refinery operations, and petrochemical facilities. The Upstream operators in the oil and gas industry will focus on harvesting value from recent discoveries and acquisitions through more efficient operations, looking at measuring the risks the industry is facing and the application of new technologies and innovations.

The challenges for this industry come at the same time with some fantastic opportunities emerging for the sector. In the issue of Petroleum Review, February 2012, the Energy Institute listed the top 10 opportunities for oil and gas industry in 2012.

Following on this report as well as the study by Ernst & Young on the top 10 risks for oil and gas companies, we elaborated some thoughts on the subject and made a highlight on 'Challenges' rather than view current issues as 'Opportunities'.

Below are the top 10 Challenges the Oil and Gas Industry:

1. Frontier acreage and access to reserves.

'Frontier acreage' challenge represents exploration and development of new fields that previously regarded as too difficult, too expensive or too politically unstable to justify operations. I would add also the remote locations, with newly discovered reserves, like Arctic, far North Sea, pre-salt basins in deep water of Brazil etc. Access to reserves involves competition for access to proven reserves what became more difficult in comparison to decades ago due to expansion of government role.

2. Unconventional resources.

These resources were not commercially viable until recently. Only due to technology advancement, 'unconventionals' became so popular nowadays resolving partially the issue of global demand.

The unconventional resources are shale gas, oil sands and coalbed methane (CBM). Although it is a convenient solution for our energy needs, the technology it involves, i.e. hydraulic fracturing, raises debates among communities and professionals about harm it makes to nature conservation and water resources. This in turn might impede its development through government unfavourable legislation.

3. Conventional reserves in challenging areas.

This represents mostly unstable political regime, what in turn leads to lack of security for investments. There are countries with unstable political situation (Nigeria, Lybia, Iran) or areas with new discoveries in unfamiliar environments where environmental legislation is represented by soft law. (Arctic Environmental Protection Treaty).

4. Rising emerging market demand.

As per the Energy Institute, 51% of oil and gas respondents reported making significant investments to achieve growth in emerging markets, i.e. China and other Asian economies. Since performance in emerging markets mostly is dependent on government pricing policy, a significant risk is involved for any foreign direct investments and creates the issue of 'bargaining power' of the state.

5. NOC-IOC partnership.

I would not call this a stable partnership. One of the main goals of this partnership from the IOC viewpoint is access to acreage, which is another big challenge. National Oil Companies (NOC) are the gatekeepers of their national reserves, while International Oil Companies (IOC) are the gatekeepers of their advanced technology. The growth of NOCs not only in their states but also outside their home markets, will lead to increase in power and possibility to acquire the necessary technological knowledge, what have to be very alarming for IOCs future concerns.

6. Investing in Innovation and R&D.

Every company understands nowadays, that R&D and Innovation is a key to growth and prosperity. This position creates severe competition between market-players with sufficient resources for R&D.

7. Alternative fuels, including second generation biofuels.

The environmental pressure and market demand that oil companies experience today force them to explore new industries, i.e. renewables. According to Petroleum Review, 47% of respondents had already invested in 'cleantech'. This urge requires additional resources, company policy and revised strategy.

8. Worsening Fiscal terms.

The fluctuation of fiscal regime in Host-Governments makes enormous pressure on oil companies, creates insecurity for the entire company financial strategy and investment policy. According to the first meeting of UK OIl and Gas Fiscal Forum, (Oil and Gas UK), the industry needs secure and predictable fiscal regime as there is £2.3 billion drop in expected tax revenues due to dramatic fall in exploration drilling and production. Thus, measures to stimulate investment need to be introduced as a matter of urgency. Brasil might be another example of concerns with oil and gas industry fiscal regimes, (Deloitte), as current tax policy is extremely complex and impedes the growth of the industry. Innovation in tax regimes is another 'headache' for Operating companies. China recently introduced experimental resource tax on crude oil and natural gas products with 5%-10% on sales. (BBC).

9. Price volatility and role of speculators.

The role of speculators involves huge debate between the leading energy agencies, as well as investment institutions and governments. However, this is only one of the influencing factors on oil and gas prices. The fundamental economy drivers play currently main role in reaching the equlibrium in natural gas prices. As we see, the abundance of supply today leads to lower prices. US is a perfect example (FT).

10. Corporate social responsibility.

This challenge includes relations with various stakeholder groups, health and safety concerns, i.e. human rights, employee rights, stakeholder rights, environmental protection, community relations, transparency and corruption issues. CSR requires oil companies to success in each criteria in order to build a reputation as a reliable potential partner for public-private strategic partnerships: cross-sector and government.

The above challenges represent only tiny part of concerns of this extremely complex industry. However, it provides brief overview of trends the interested party, whether it is oil company or investment institution, needs to take into consideration while building its strategy.

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